BROWNING & ASSOCIATES, INC.
Environmental Consultants

July 29, 1996

Mr. Jeff Clayton
R.H. Johnson & Company
801 West 47th Street, Suite 219
Kansas City, MO 64112

Re: Final Report
Phase II Environmental Site Assessment
Leo Eisenberg Site
North Kansas City, Missouri

Dear Mr. Clayton:

Enclosed please find one original of Browning & Associates, Inc.'s (B&A's) final report of the Phase II Environmental Site Assessment for the above-referenced property. Two (2) originals have been previously submitted to the state and one (1) original to Mr. John Crawshaw of the EPA.

Should you have any questions, please do not hesitate to contact me at (913) 334-9600.

Sincerely,
BROWNING & ASSOCIATES, INC.

William R. Browning

WRB/jms
enc.

1225 N. 78th Street, Suite. J, Kansas City, KS 66112, (913) 334-9600

BROWNING & ASSOCIATES, INC.
Environmental Consultants

July 22, 1996

Mr. Jim Belcher
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

Re: Phase II Environmental Site Assessment
Leo Eisenberg Site
North Kansas City, Missouri

Dear Mr. Belcher:

Enclosed please find two (2) copies of Browning & Associates, Inc.'s (B&A's) report of the Phase II Environmental Site Assessment for the above-referenced property. Our client has asked that we provide your office with this report.

In the preparation of this report, B&A followed a work plan approved by our client. B&A submitted a copy of this same work plan to the Missouri Department of Natural Resources (MDNR), but according to Ms. Julie Kelsey, the MDNR could not review or comment on same.

The work plan was also reviewed with Mr. John Crawshaw, EPA Region VII, who indicated that the basic plan was acceptable to him and provided B&A with technical data needed in the preparation of this report.

In summary, slightly elevated levels of arsenic were noted, slightly above background levels. Please refer to the Executive Summary or the actual report for a complete discussion.

Should you have any questions, please do not hesitate to contact me at (913) 334-9600. B&A can make itself available to meet with the MDNR, if desired.

Sincerely,
BROWNING & ASSOCIATES, INC.

William R. Browning

WRB/jms
enc.

cc: Mr. John Crawshaw, EPA Region VII, w/att

1225 N. 78th Street, Suite. J, Kansas City, KS 66112, (913) 334-9600

INVESTIGATION AND PHASE II ENVIRONMENTAL SITE ASSESSMENT

LEO EISENBERG SITE
16th AND INTERSTATE 35
NORTH KANSAS CITY, MISSOURI

Prepared for:

NORTHTOWN DEVCO
c/o MR. JEFF CLAYTON
801 WEST 47th STREET, SUITE 219
KANSAS CITY, MISSOURI 64112

Prepared by:

Browning & Associates, Inc.
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(913) 334-9600
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Draft issued March 1996

Final issued July 1996

William R. Browning

EXECUTIVE SUMMARY

Introduction

Browning & Associates, Inc. was retained by Mr. Jeff Clayton of the RH Johnson Company (RHJ) on behalf of Northtown Devco (DEVCO) to conduct an investigation/Phase II environmental site assessment of the approximately thirty (30) acres of property bound by 16th Street to the south, Interstate 35 (I-35) to the west, and a railroad yard to the east which is located in North Kansas City, Missouri. The subject site is referred to as the Leo Eisenberg Fill Site by both the Missouri Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (EPA).

The subject site is comprised of two distinct areas. The south approximate 10 acres is currently being used/leased by the MoKan Container Service (MoKan) for the purposes of storing/staging over-the-road trailers used in local deliveries. The northern approximate 20 acres is currently undeveloped.

The purpose of this investigation was to confirm or deny the existence of contamination which may exist on the site and to what extent (if possible), and to characterize the type of fill historically allowed on the site and whether this fill meets MDNR regulations. This was accomplished with the installation of monitoring wells on the subject site and by unearthing the fill and examining the fill in seventeen test pits scattered across the site.

Results

Water Quality Results

Metals

As indicated in Tables 8 through 13 herein, most of the readings were low to non-detected. The following was noted per sample:

MW-1 Groundwater arsenic level tested above the SCDM; MW-1 Arsenic = 24.3 ppb versus SCDM Arsenic Value = 11.0 ppb.

MW-2 None of the constituents tested greater than the SCDM.

MW-3 Groundwater arsenic level tested above the SCDM; MW-3 Arsenic = 14.9 ppb versus SCDM Arsenic Value = 11.0 ppb.

MW-4 Groundwater arsenic level tested above the SCDM; MW-4 Arsenic = 17.6 ppb versus SCDM Arsenic Value = 11.0 ppb.

The lead value in MW-4 was slightly higher than the EPA Region III (adapted by Region VII) drinking water standard. However, the groundwater is untreated versus a tap drinking water standard.

PCBs

All of the groundwater samples tested non-detect for PCBs.

Organochlorine (pesticide) Compounds

None of the groundwater samples tested for any of the organochlorine compounds via EPA method 8080 or 8240.

Volatile Organics (GC/MS)

None of the groundwater samples tested for any of the volatile organic compounds via EPA method 8240.

Semi-volatile Organics (GC/MS)
None of the groundwater samples tested for any of the semi-volatile organic compounds via EPA method 8270.

Soil Results from Monitoring Wells
As indicated in Tables 4 through 7, none of the soil samples obtained from the monitoring wells contained any metal above the SCDM value. The arsenic in MW's -2, -3, and -4 did have arsenic slightly above the Missouri ASL value.

Soil Results from Excavation Pits
Metals
The results of the soil testing was compared to the SCDM (Table 14) and the Missouri ASL values (Table 15). None of the constituents (metals) in the nine soil samples tested above the SCDM were a SCDM level was provided by the EPA.

When compared to the Missouri ASL, arsenic above the ASL value of 11.0 ppb was noted in Pit Nos. 6, 9, 13, and 17. None of the other constituents were above the ASL value where an ASL value was provided.

Semi-volatile Organics
Neither the EPA nor the state of Missouri had many values (SCDM or ASL) by which results could be compared. For those constituents where SCDM and ASL values were provided, none of the excavation pits had readings which exceeded the SCDM/ASL value.

Observations of the Fill Material in 17 Pits
The typical pit contained fill soil, concrete, concrete block, brick, and a small amount of rebar. Rebar is common to concrete-related demolition wastes. B&A noted a minor amount of asphalt scattered in areas/pits, none of which was larger than 5 to 10 pounds. B&A noted no other materials in any of the pits, except for Pit No. 5 which had a concrete tremie, an inert plastic/woven cloth material.

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1.0 INTRODUCTION AND HISTORY

1.1 INTRODUCTION

Browning & Associates, Inc. was retained by Mr. Jeff Clayton of the RH Johnson Company (RHJ) on behalf of Northtown Devco (DEVCO) to conduct an investigation/Phase II environmental site assessment of the approximately thirty (30) acres of property bound by 16th Street to the south, Interstate 35 (I-35) to the west, and a railroad yard to the east which is located in North Kansas City, Missouri (subject site herein). The subject site is referred to as the Leo Eisenberg Fill Site by both the Missouri Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (EPA). Figure 1 illustrates the location of the subject site.

The subject site is comprised of two distinct areas. The south approximate 10 acres is currently being used/leased by the MoKan Container Service (MoKan) for the purposes of storing/staging over-the-road trailers used in local deliveries. The northern approximate 20 acres is currently undeveloped.

1.2 REGULATORY HISTORY

According to MDNR records, the subject site was first discovered on February 8, 1989, by the EPA. The EPA completed a Preliminary Assessment (PA) pursuant to their investigation. According to the Site Investigation (SI2) performed by the MDNR, the MDNR visited the subject site in 1989, 1993, 1994, and 1995, without the knowledge of the owner.

B&A reviewed the MDNR files on February 5, 1996, and requested that certain technical sections of the file be copied and forwarded to B&A's Kansas City office. This information was not received prior to the development of the work plan, but was delivered on February 19, 1996.

B&A also requested of the EPA to review their file on the subject site, or that a copy of the file be forwarded to B&A's Kansas City office. The EPA data was also not received prior to the development of the work plan. The EPA information was received on approximately February 27, 1996.

The 10 acres occupied by MoKan was the focus of the original MDNR investigation. In April 1988, the EPA responded to a call from the North Kansas City Fire Department concerning several pools of an unknown liquid reportedly "oozing" from an area near the intersection of 16th Street and I-35. In a subsequent inspection by the EPA, their inspectors found three (3) pools of a dark stained water. The location of the pools were in what is now believed to be the northeastern corner of the MoKan area.

The EPA collected a sample of the surface water and had it analyzed for organic pollutants and metals. The results of the EPA analysis are presented in Table 1. The EPA reportedly found arsenic at 4.4 ppm and vanadium at 100 ppm based on laboratory analysis.

The MDNR first investigated the site on July 25, 1989. During the original Site Investigation (SI) the MDNR noted two (2) shallow pools of stained water. The MDNR collected samples of surface water and a sample of the fill underlying the surface water. The exact location of where the water and soil samples were taken could not be ascertained during the file review. According to the sketch provided in the SI, it appears the MDNR sampled soil along the west side of Interstate 35 (I-35) versus the east side of I-35 where the subject site is actually located. Results of the MDNR sampling are presented in Table 2.

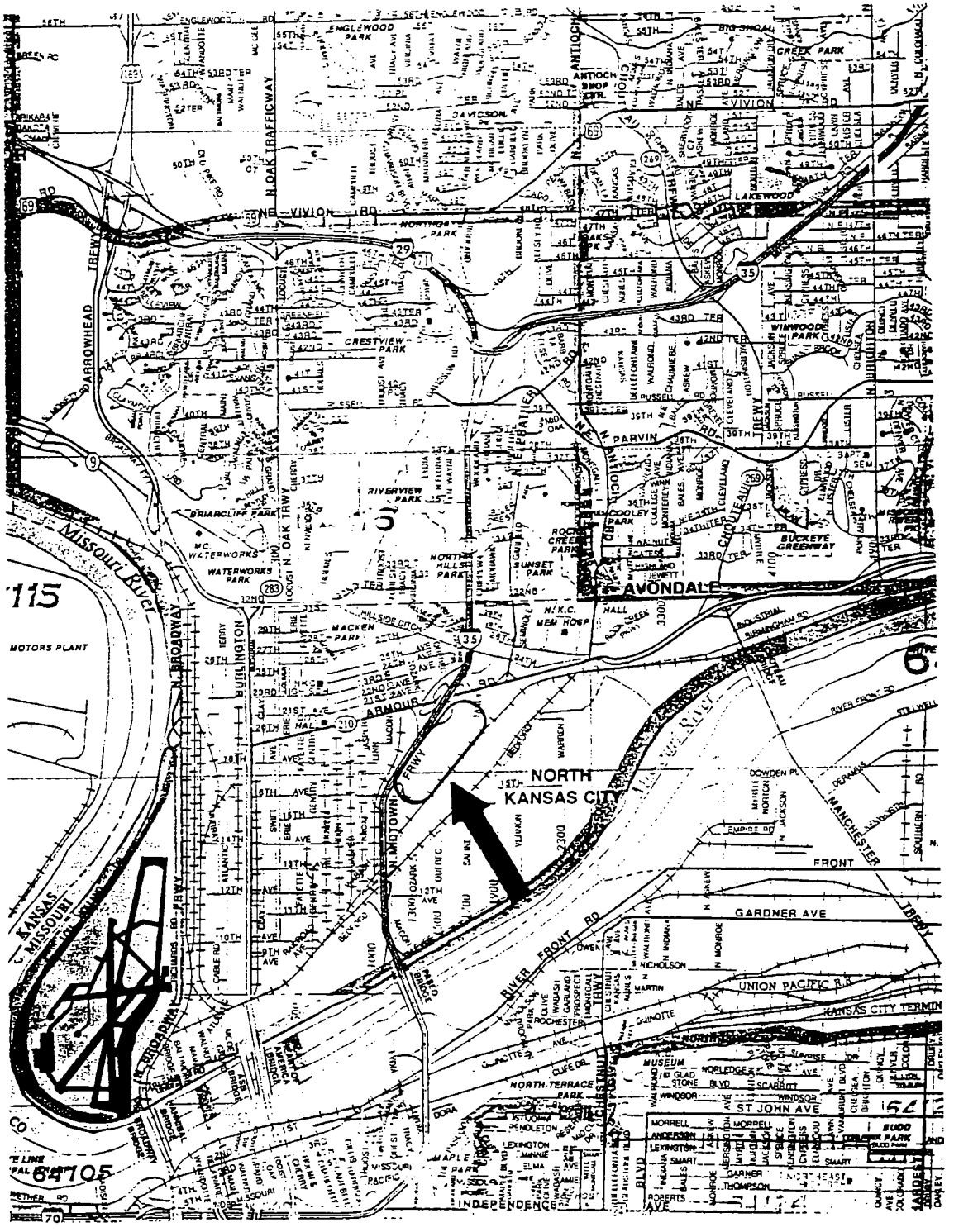

FIGURE 1. GENERAL LOCATION MAP SHOWING SITE

BROWNING & ASSOCIATES, INC.

Table 1. EPA Data from Samples Collected April 6, 1988[1]

Constituent	Pooled Water (ppb)	Benchmark (ppb)
Aluminum	28,000	---
Arsenic	4,400	190
Barium	740	---
Cobalt	150	---
Chromium	500	210
Copper	5,500	12
Iron	43,000	1,000
Manganese	1,800	---
Molybdenum	1,700	---
Nickel	5,000	160
Lead	190	3.2
Titanium	870	---
Vanadium	100,000	---
Zinc	610	110
Calcium	150	---
Sodium	10,000	---

--- Indicates substance was either not present or present below detection limits.

[1] Taken from Site Investigation Report, dated September 28, 1990. Prepared by MDNR.

Table 2. MDNR Data from Samples Collected July 25, 1989[1]

Constituent	Pooled Water - Soil (ppb)[2]	Upgradient - Soil (ppb)[3]	Pooled Water (ppb)[4]	SCDM Soil Value (ppb)	SCDM Surface Water (ppb)
Silver	170	72	7.1	2,900,000	0.12
Barium	140,000	200,000	600	41,000,000	---
Cadmium	3,600	2,300	57	290,000	1.10
Chromium	10,000	12,000	170	2,900,000	210
Mercury	1,500	850	690	170,000	0.012
Lead	84,000	38,000	180	---	0.08
Selenium	200	120	15	2,900,000	36
Vanadium	85,000	17,000	1,900	4,100,000	---
Benzo(a)anthracene	3,800	---	---	---	---
Benzo(a)pyrene	3,800	800	---	80	---
Benzo(b)fluoranthene	7,400	700	---	---	---
Benzo(ghi)perylene	3,500	---	---	---	---
Bis(2-ethylhexyl)phthalate	600	600	37	42,000	---
Chrysene	5,100	600	---	---	---
Fluoranthene	7,600	800	---	23,000,000	---
Indeno(1,2,3-cd)pyrene	3,000	---	---	---	---
Phenanthrene	3,900	---	---	---	---
Pyrene	9,500	700	---	17,000,000	---

--- Indicates substance was either not present or present below detection limits.

Notes:

1. Based on a review of the SI prepared in conjunction with these laboratory results, it appears the sampling was performed on the west side of I-35 or the sketch provided in the SI was in error. Other analytes were examined, but were BDL; therefore, were not reported herein.

2. MDNR Project Code: 3535/3000 and/or Sample No. 89-1736.

3. MDNR Project Code: 3535/3000 and/or Sample No. 89-1737.

4. MDNR Project Code: 3535/3000 and/or Sample No. 89-1738.

On April 27, 1995, the MDNR reinspected (SI2) the subject site and noted recent fill or dumping. The material was reported by the MDNR to be a type of "sludge." The MDNR collected soil samples from the north side of the MoKan area for analysis. During the SI2, the sampling points of the SI could not be verified. The MDNR also collected samples of soil near the I-35 exit ramp onto 16th Street for analysis to be used as background or as a comparison to the site sample results. The sketch provided in the SI2 did not allow for field verification of the results due to the fact only the general locations of the sampling points were provided. The results of the laboratory analysis are presented in Table 3.

1.3 SITE DEVELOPMENT HISTORY

B&A obtained aerial photographs from the county and city planning and mapping departments for the subject site and surrounding area. The following discusses the development of the site starting in 1967. Copies of the aerials are included in Attachment A.

1967

In 1967, the subject site was not developed or being uses. There were no distinct areas of segregation on the site (i.e., MoKan portion). The surrounding areas to the north, east, southeast, and south were all developed along industrial lines.

There was no evidence of scaring on the subject site or that the site had been used as a depository for fill. The pump or lift station was noted to the east of the site.

1975

No changes were noted to the subject site between 1967 and 1975. There was no evidence of scaring on the subject site or that the site had been used as a depository for fill.

1980

No changes were noted to the subject site between 1975 and 1980. There was no evidence of scaring on the subject site or that the site had been used as a depository for fill.

1985

In 1985, one area was noted on the subject site which was a different color than the rest of the site. The aerial does not provide sufficient detail to fully delineate the marking, but it could have been the result of mowing/farming. Historically, the site was used for wheat until the owner wanted to raise the elevation for future development purposes.

1990

In the 1990 aerial it was noted a portion of the site may have started receiving fill. Most of the western side of the site appeared to have a vegetative cover. MoKan was not yet using the southern 10 acres of the site.

1995

By 1995, MoKan was occupying the southern portion of the site. Several scarred areas were noted in the northern 20 acres presumably associated with the landfilling operation.

Interviews

According to Mr. Vic Strick, NT Reality and manager over the site for numerous years, the site was formerly used for agricultural (wheat production) purposes. Several of the aerials suggest this former use.

Table 3. MDNR Data from Samples Collected April 27, 1995

Constituent	SCDM Reference Value (ppm)	Background - Soil (ppm)[1,2]	North Side MoKan - Soil (ppm)[2,3]
Arsenic, total	0.33	10.5	6.18
Barium, total	41,000	241	25.9
Cadmium, total	290	1.03	ND
Chromium, total	2,900	19.8	33.5
Lead, total	---	32.5	14.3
Selenium, total	2,900	ND	2.79
Vanadium, total	4,100	142	209
Naphthalene	---	ND	0.035
2-Methylnaphthalene	---	ND	0.035
Dibenzofuran	---	ND	0.024
Phenanthrene	---	ND	0.086
Fluoranthene	23,000	0.1	ND
Pyrene	17,000	0.073	ND

--- Indicates substance was either not present or present below detection limits.

1. MDNR Sample No. 95-0640. Project Code 3658/3378.
2. As published in SI2 dated August 7, 1995.
3. MDNR Sample No. 95-0644.

According to Mr. Strick, the owner of the site had a "land use" study performed several years ago whereby the consultant indicated the site would have to be raised for future development. The owner contracted/allowed Shaw Excavating to place approximately 90,000 cubic yards of fill and excavation materials from the Hospital Hill project. Mr. Strick indicated that Shaw did not place any demolition materials on the site. Mr. Strick also indicated that in recent years others have wanted to use the site for disposal, but were not allowed to do same by the owner.

1.4 PURPOSE

The purpose of this investigation was to determine the following:

- To confirm or deny the existence of contamination which may exist on the site and to what extent, if possible

- Characterize the type of fill historically allowed on the site, and whether this fill meets MDNR regulations

2.0 PHYSICAL SITE

2.1 LOCATION

The subject site is located on the eastern side of I-35 and north of 16th Street in the city limits of North Kansas City, Clay County, Missouri. The site location is in the approximate center of the SW 1/4 of Section 13, Township 50 North, Range 33 West.

2.1.1 Site Description

The subject site is comprised of two distinct areas. The south approximate 10 acres is currently being used/leased by the MoKan Container Service for the purposes of storing/staging over-the-road trailers used in local deliveries. The northern approximate 20 acres is currently undeveloped.

Historically, the owner of the site has attempted to raise the elevation of the site by allowing fill to be placed on the site. According to Mr. Strick, the elevation of the subject site has been raised approximately five feet through this process.

2.1.2 Utility Locate

Mr. Browning contacted the utility locate service 1-800-DIG-RITE on Friday, February 9, 1996, in preparation for drilling to begin the week of February 19. The locate company agreed to notify applicable utilities and provided Confirmation No. 401105. The city of North Kansas City water and sewer had to be contacted separately. Storm sewers are somewhat evident on the site.

2.1.3 Site Access

Prior to preceding to the site, B&A received authorization from Mr. Greg Rhodus, NT Reality, Inc., to be on the premises. Prior to finalizing the draft work plan, B&A walked the entire site on February 12.

General access to the site is unrestricted; although, the road leading to the site is somewhat obscure. Access to the site is only available by vehicular means by a gravel road leading north from 16th Street adjacent to the MoKan Container site. Foot traffic is unrestricted, for the most part.

During our field investigation, B&A noted utilities (electric and water) using the gravel road and driving on portions of the site. B&A also noted a tree trimming contractor, Asplundh, accessing the site.

3.0 ENVIRONMENTAL SETTING

3.1 SURROUNDING LAND USE

The site resides in an industrialized area of North Kansas City. To the west of the subject site is Interstate 35 (I-35), followed by area offices, office-warehouses, and other small-to-medium commercial and industrial facilities.

North of the site is the Armour Road exit to I-35 followed by Armour Road. Armour is developed along light commercial to light industrial facilities. Some retail facilities (e.g., gasoline station, restaurants, etc.) were noted. Further north, the area becomes residential and residential related.

To the northeast is US Gypsum, a manufacturing facility. To the northeast is the ADM Milling facility.

East of the site is a portion of the ADM facility and the railroad yard. The area between the railroad yard and the levy is predominantly industrial. Further east is an undeveloped area and a riverboat gaming facility.

South of the site is a trucking facility. Further south, between 16th Street and the river, the area is industrial. Refer to Attachment A for copies of aerial photographs depicting the area surrounding the subject site.

3.2 GEOLOGICAL SETTING

Based on information received from the MDNR, the underlying bedrock is of the Pennsylvanian age and probably of the Pleasanton group which consists of shale, limestone, and sandstone. The thickness of the bedrock is estimated to be 30 to 80 feet in the area of the subject site. The bedrock in this area (low permeability of the shale) is believed to act as an aquatard preventing the migration of shallow groundwater to deeper groundwater sources.

3.3 SOIL SURVEY

According to the Soil Survey book issued January 1986, by the United States Department of Agriculture-Soil Conservation Service, in cooperation with the Missouri Agricultural Experiment Station, the soils underlying the subject site belong to the Leta silty clay series.

The Leta silty clay series consists of deep, nearly level, somewhat poorly drained soils on bottom land of the Missouri River. The surface layer is typically a very dark gray, very firm silty clay about 5 inches thick. The subsurface layer, approximately 9 inches thick, is also very dark gray, very firm silty clay.

The subsoil is a dark grayish brown, very firm silty clay approximately 20 inches thick. The substratum to a depth of approximately 60 inches is stratified light olive brown, dark grayish brown, and grayish brown, friable silt loam and very fine sand loam.

Permeability is generally slow in the upper part of the Leta soil and moderate in the loamy portion. Surface runoff is slow.

Groundwater is estimated to be at a depth close to the surface elevation of the Missouri River.

3.4 HYDROLOGICAL SETTING

The subject site is located within the Missouri River flood plain and alluvial area in an industrial section of North Kansas City. The thickness of the alluvial material above bedrock to be between 70 and 140 feet.

Since the site is located in the Missouri River flood plain, it also considered to be located in the Missouri River watershed. The main groundwater discharge is seepage from the aquifer to the Missouri River. The alluvial aquifer is, in turn, recharged by the Missouri River especially during prolonged high-river stages.

The dominant regional groundwater flow direction is toward the south or southeast. Groundwater flow direction in the alluvial deposits varies depending on the time of year, precipitation, etc. The direction of flow may be reversed during periods of prolonged high-river stage when the aquifer is recharged. The greatest amount of fluxuation would be expected to be near the river and would not be expected to change very much at the subject site due to the distance between the site and the river.

3.5 WELLS IN AREA OF SITE

As part of their investigation of the subject site, the MDNR conducted a search of all water wells in the area of the site used for drinking water and other uses. The following information was obtained from the MDNR files forwarded to B&A:

- 4 wells at Highway 9 (Burlington) and Armour.
- 1 intake on the upstream portion of the Missouri River off Highway 169 and Briarcliff Park.
- 9 wells located along upstream portion of river adjacent to Highway 169 (N. Broadway) between 32nd Street and Briarcliff Park.
- 2 wells located along upstream portion of river adjacent to Arrowhead Trafficway Near Briarcliff Park.
- 5 wells located on the upstream portion near Highway 9 and N. Monett Road in Riverside.

Refer to Figure 2 for the location of these wells/intakes. None of the aforementioned wells are any closer than 2.0 miles from the subject site.

3.6 SITE TOPOGRAPHY

The overall contour of the subject site is mostly flat. With the addition of the fill, the site has been given a slight contour to prevent, for the most part, standing water. The elevation of the site is estimated to be approximately 720 to 730 feet above mean sea level.

In general, runoff originating on the northern 20-acre tract can flow to the west (feeding into the stormwater ditch paralleling I-35), to the east and off site, and to the north (minor amount). Some stormwater originating on the MoKan portion can flow off site to the south and to the west. For the most part, stormwater generated on the MoKan site would be expected to stay in the area generated.

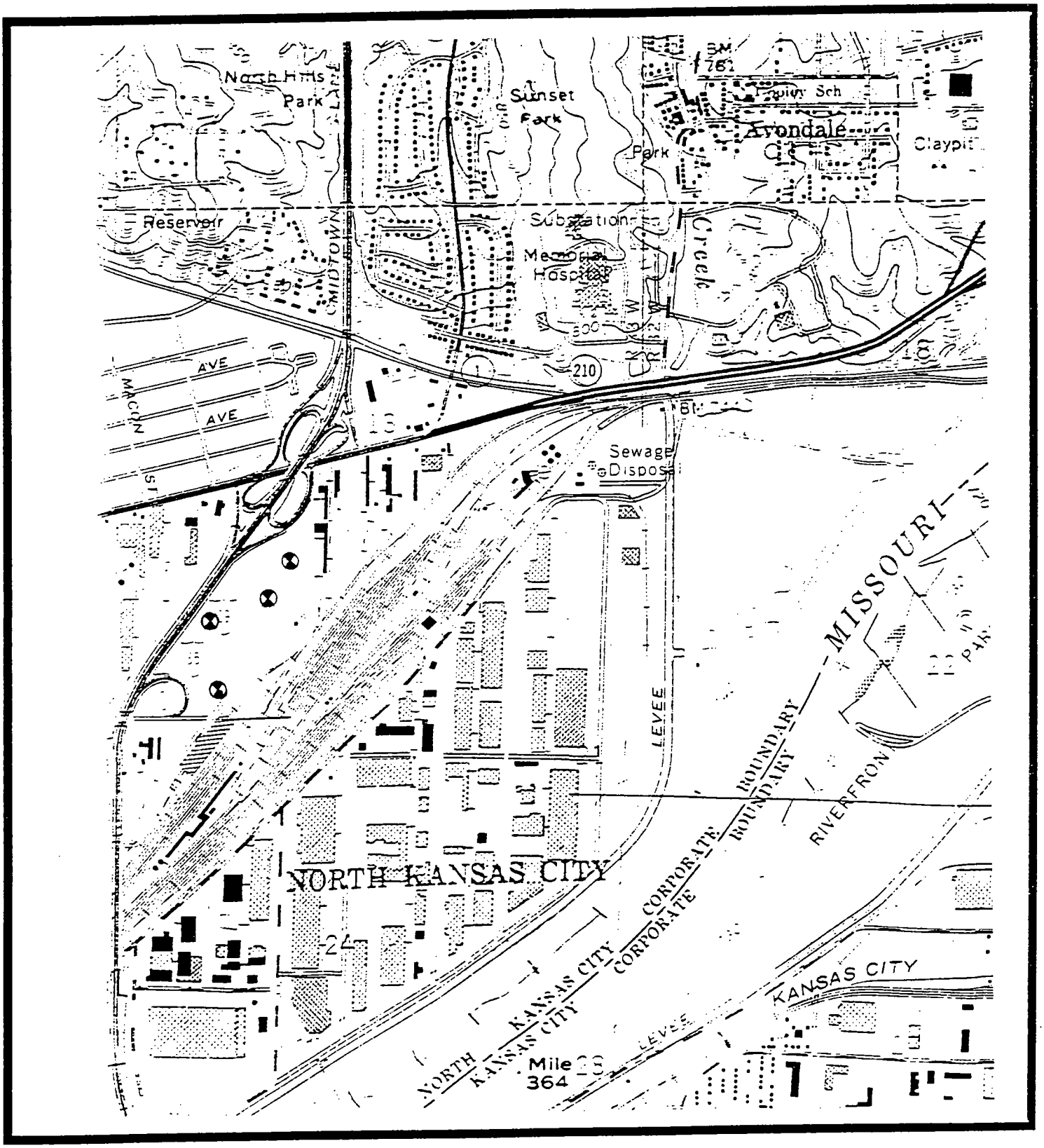

FIGURE 2. TOPOGRAPHY MAP

BROWNING & ASSOCIATES, INC.

4.0 WORK PLAN PROCEDURES

4.1 EXCAVATION

4.1.1 Fill Investigation

In one of B&A's conversations with the MDNR (Ms. Julie Kelsey on February 1 at approximately 3:10 p.m.), one of the MDNR's concerns was the "type" of fill which had been placed on the site. In an effort to review the material historically placed on the site, B&A arranged to have a backhoe operator unearth the fill in 17 locations, whereby B&A documented its observations narratively and via photographs.

B&A used a combination front-end loader/backhoe to unearth the fill. Refer to Figure 2 for the estimated locations of the excavated areas. Only field notes as to the location of the excavation pits were made, no survey as-builts were made.

Photographs of the excavated areas were taken and are provided in Attachment B. The soil/fill removed from a specific excavated area was examined/characterized and described herein. Excavated material was placed into the pit from which it came after characterization. Samples of the fill material were collected from the wall of each pit and composited for laboratory analysis. The pit walls were selected in the event that definitive characterization would be required by layer/lift. The backhoe and other equipment used in the excavation was decontaminated between excavation sites, to prevent cross-contamination.

In conjunction with the excavation, B&A installed four (4) monitoring wells lengthwise (north to south direction) across the site for the collection of groundwater samples. Groundwater was analyzed for RCRA metals and other, as needed. Refer to Figure 3 for the location of the monitoring wells.

B&A started the field portion of the investigations February 26, 1996. Representatives of the EPA and MDNR were requested/encouraged to review the work progress. The EPA visited the site on February 26, 1996. The MDNR declined our invitation.

4.1.2 Subcontractor Selection

B&A utilized the geotechnical/drilling firm of GSI/General Testing, Inc. (GSI) of Kansas City, Missouri, to perform the drilling.

Pace, Inc. (Pace) and Environmental Hazard Services, Inc. (EHS) were selected to analyze the samples. EHS provided a quicker turnaround time on soil samples analysis for total and TCPL RCRA metals. B&A used this information as a screening tool. Pace analyzed all the soil samples from the pits and all groundwater samples.

4.1.3 Property Access

As previously mentioned, B&A received authorization to drill on the subject site from Mr. Greg Rhodus of NT Reality.

4.1.4 Cuttings and Water Removed

As part of the contract with GSI, 55-gallon drums were provided to contain the bore cuttings. No obvious signs (e.g., odor, discolored soil or water, etc.) were encountered. No surface contamination (pools of liquid, discolored soils, sludges, etc.) were noted during any of B&A's field screening.

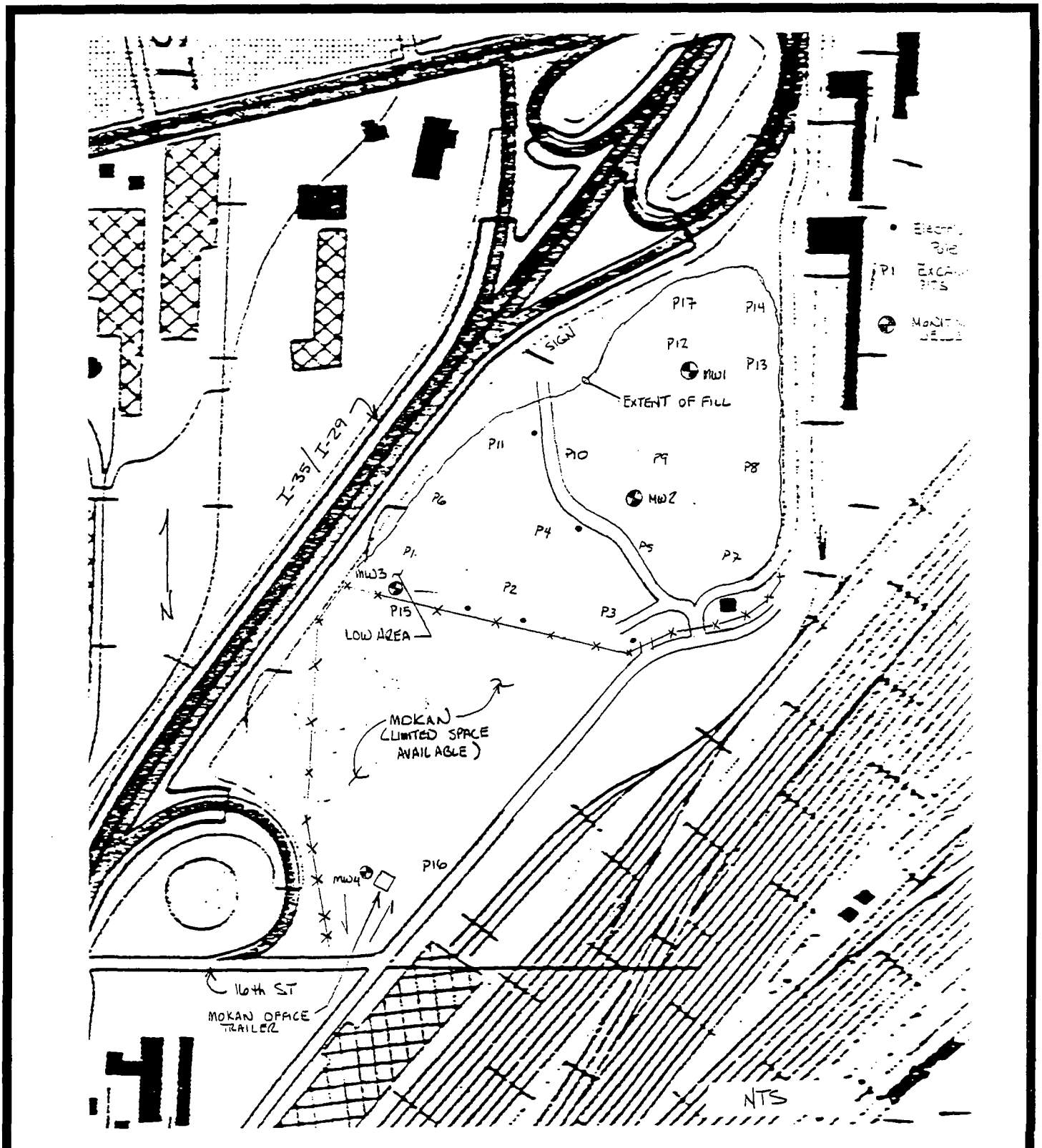

FIGURE 3. EXCAVATION AND MONITORING WELL SITES

BROWNING & ASSOCIATES, INC.

4.2 ON-SITE ACTIVITIES

4.2.1 Safety

As required in their contract, GSI provided a site Health and Safety Plan for all GSI personnel. A GSI representative was noted reviewing the plan with all personnel. B&A supplied its own site Health and Safety Plan for its personnel. Copies are retained in B&A's file.

4.2.2 General Housekeeping

Due to surface soil conditions, damage/disturbance to the immediate area were kept to a minimum. After completion of the excavation and the characterization of the samples, the fill material was returned to the pit from which it came to prevent possible safety concerns. In several cases, large pieces of concrete were removed from the pit and had to be left close to the surface. The site was kept free of other waste and debris resulting from the sampling and investigative process.

4.2.3 Decontamination Procedures

All drilling and excavation equipment was steam-cleaned prior to arrival/use on site. The drilling and excavation equipment was steam-cleaned/decontaminated after their use in one location and prior to their subsequent use in a further location to prevent cross-contamination.

All samples were collected using surgical gloves so as to not cross-contaminate the soil/groundwater samples. All samples were placed in sterile containers provided by Pace and EHS and then placed in insulated coolers. Due to ambient weather conditions (below 32 degrees Fahrenheit) on each field day, no ice was required, but was available. Samples were monitored for temperature which never rose above 32 degrees F.

4.2.4 Laboratory Analysis

B&A reviewed the reports prepared by the MDNR and had nine of the seventeen pit soil samples analyzed for the same constituents. Pit soil samples were analyzed for RCRA metals and semi-volatile organics. Pace retained the soil samples for three (3) months, which was identified as longer than their normal holding time of two (2) months. B&A was not aware or told by Pace that the remaining samples were in process of being disposed. B&A made the decision to only have nine of the seventeen analyzed after consultation with DEVCO due to the estimated cost of all laboratory services as outlined to B&A by Pace.

Soil samples were collected from MWs 2, 3, and 4, by use of a 2-foot split spoon soil auger. Samples were collected in the fill and in the native soil underlying the fill. Due to driller error, no soil sample was retrievable from MW 1. B&A submitted these samples to EHS for analysis of total and TCLP RCRA metals. The results are presented in Tables 4 through 7.

All groundwater samples were analyzed for RCRA Metals (total), pesticides/herbicides, PCBs, and volatile and semi-volatile organics (Methods 8240 and 8270).

5.0 SOIL SAMPLING AND ANALYSIS

5.1 INTRODUCTION PRE-BORING ACTIVITIES

This section describes soil sampling and laboratory analyses activities at the Leo Eisenberg site.

5.1.1 Premobilization Activities

As previously discussed, the state locate service (1-800-522-6543) was contacted to locate utilities prior to mobilization. This was completed on February 12, 1996. B&A noted on February 19 and 26, that there were no utility locate marks anywhere on the site. Electric lines were noted as being overhead.

B&A representative spoke with GSI numerous times during the week of February 19, to confirm drilling operations and assure the needed equipment would be available.

5.2 BORING LOGS

Boring logs were kept for monitoring wells (MWs) 2, 3, and 4 and are summarized as follows:

MW-2 From 2.5 to 4.5 feet, reddish brown silty clay. 6 to 8 feet brown-gray clay. From 10 to 12 feet dark gray, silty clay. From 14 to 16 feet gray-brown clay. Sand noted beginning at 16 feet. No odors were noted.

MW-3 From 2 to 3 feet a dark gray silty clay. From 3 to 4 feet a reddish brown silty clay. From 6 to 8 feet gray fill varying in layers from silty clay to friable silt. From 10 to 12 feet a gray-brown friable sandy silt. From 10 to 12 gray silty clay.

MW-4 Insufficient return in 2 to 4 foot section due to rock encountered. From 4 to 6 feet, dry friable silt. From 6 to 8 feet dark gray to brown silty clay varying from friable to moderately plastic. From 8 to 10 feet gray-brown silty clay. From 10 to 12 feet gray brown silty clay. Roots noted at 11.0 feet.

Due to an error on the part of GSI, B&A could not log MW-1.

5.3 SITE ACTIVITIES AND PROCEDURES

5.3.1 Boring Methodology

Due to the space provided by the layout of the subject site, B&A was able to utilize a truck-mounted drilling rig, with continuous sampling. Soil samples were collected from MWs 2, 3, and 4, by use of a 2-foot split soil auger. Samples were collected in the fill and in the native soil underlying the fill. Due to driller error, no soil sample was retrievable from MW 1.

Between each drilling location, the augers were decontaminated to prevent cross-contamination.

B&A submitted these samples to EHS for analysis of RCRA metals by TCLP and total metals as a screening. Results of the monitoring well soil samples are presented in Tables 4 through 6.

5.3.2 Site Cuttings

B&A utilized DOT-approved 55-gallon drums to contain cuttings and groundwater from the borings in the event that contamination was encountered. The drums are placed adjacent to each monitoring well. These drums have since been labeled non-hazardous waste by B&A.

Table 4. Soil Samples from Monitoring Wells: Depth in the 2- to 4-foot Range

TCLP Method

Constituent	Detection Limit	HWCL[1]	Monitoring Well 2	Monitoring Well 3	Monitoring Well 4[2]
	ppm	ppm	ppm	ppm	ppm
Arsenic	0.300	5.00	<0.300	<0.300	<0.300
Barium	0.200	100.00	0.891	1.54	1.23
Cadmium	0.250	1.00	<0.250	<0.250	<0.250
Chromium	0.200	5.00	<0.200	<0.200	<0.200
Lead	0.400	5.00	<0.400	<0.400	<0.400
Mercury	0.001	0.200	<0.001	<0.001	<0.001
Selenium	0.350	1.00	<0.350	<0.350	<0.350
Silver	0.200	5.00	<0.200	<0.200	<0.200

Notes:
1. Hazardous waste characteristic level.
2. Due to rocks encountered in drilling, an insufficient amount of sample was obtained at the 2 to 4 foot range. Sample was obtained from the 4 to 6 deep depth.

Table 5. Soil Samples from Monitoring Wells: Depth in the 2- to 4-foot Range

Total Metals (Method SW 846 3050A/6010A)

Constituent	Detection Limit	SCDM Value[2]	ASL Value[3]	Monitoring Well 2	Monitoring Well 3	Monitoring Well 4[1]
	ppb	ppm	ppm	ppm	ppm	ppm
Arsenic	22.0	170.0	11.0	<8.60[5]	**13.50**	<8.90[5]
Barium	7.00	41,000.0	3,900.0	<4.01	138.00	150.00
Cadmium	8.50	290.0	28.0	<4.87	<4.90	<5.03
Chromium	12.00	2,900.0	280.0	<6.88	19.10	<8.39
Lead	44.00	400.0[4]	400.0	<25.30	<25.40	<46.10
Mercury	0.10	170.0	17.0	<0.481	<0.463	<0.474
Selenium	22.00	2,900.0	280.0	<12.70	<12.70	<13.00
Silver	5.00	2,900.0	280.0	<2.87	<2.88	<2.96

Notes:

1 Due to rocks encountered in drilling, an insufficient amount of sample was obtained at the 2 to 4 foot range. Sample was obtained from the 4 to 6 deep depth.

2. Superfund Chemical Data Matrix as provided by EPA Region VII.

3. Missouri All Use Soil Levels values as provided by EPA Region VII.

4. Allowable level in soil in residential areas.

5. Originally reported by EHS as <12.7 and <13.0 ppm for MW2 and MW4, respectively. Through further analysis by EHS, it was determined that both MW2 and MW4 arsenic levels were below 11.0 ppm.

Table 6. Soil Samples from Monitoring Wells: Depth in the 10- to 12-foot Range

TCLP Method

Constituent	Detection Limit	Regulatory Limit	Monitoring Well 2	Monitoring Well 3	Monitoring Well 4
	ppm	ppm	ppm	ppm	ppm
Arsenic	0.300	5.00	<0.300	<0.300	<0.300
Barium	0.200	100.00	1.43	1.45	1.10
Cadmium	0.250	1.00	<0.250	<0.250	<0.250
Chromium	0.200	5.00	<0.200	<0.200	<0.200
Lead	0.400	5.00	<0.400	<0.400	<0.400
Mercury	0.001	0.200	<0.001	<0.001	<0.001
Selenium	0.350	1.00	<0.350	<0.350	<0.350
Silver	0.200	5.00	<0.200	<0.200	<0.200

Notes:
1. 10- to 12-foot range were determined to be native.

Table 7. Soil Samples from Monitoring Wells: Depth in the 10- to 12-foot Range

Total Metals (Method SW 846 3050A/6010A)

Constituent	Detection Limit	SCDM Value	ASL Value[3]	Monitoring Well 2	Monitoring Well 3	Monitoring Well 4
	ppb	ppm	ppm	ppm	ppm	ppm
Arsenic	22.00	170.0	11.0	**11.3**	<9.60[5]	**11.90**[5]
Barium	7.00	41,000.0	3,900.0	163.0	169.00	199.00
Cadmium	8.50	290.0	28.0	<4.79	<5.42	<6.18
Chromium	12.00	2,900.0	280.0	11.80	<7.64	<18.30
Lead	44.00	400.0[4]	400.0	<24.80	<28.10	<32.00
Mercury	0.10	170.0	17.0	<0.47	<0.433	<0.481
Selenium	22.00	2,900.0	280.0	<12.40	<14.10	<16.00
Silver	5.00	2,900.0	280.0	<2.82	<3.19	<3.64

Notes:

1. 10- to 14-foot range were determined to be native.
2. Superfund Chemical Data Matrix as supplied by EPA Region VII.
3. Missouri Any Use Soil Levels Values as supplied by EPA Region VII.
4. Allowable level in soil in residential areas.
5. Originally reported by EHS at <12.4, <14.1, and <16.0 ppm for MW2, MW3 and MW4, respectively. At B&A's request, EHS refined their analysis to those readings reported herein.

5.3.3 Safety
As required in their contract, GSI provided a site health and safety plan for all Davis personnel. B&A supplied a site health and safety plan for its personnel.

5.3.4 General Housekeeping
Due to constraints and various pieces of equipment belonging to the building nearby, damage/disturbance to the surrounding area was not encountered.

The general area of the borings were kept clean and free of waste. No waste, debris, etc., was allowed to fall into the borings.

5.3.5 Excavation Methodology
Due to the vast space provided by the layout of the subject site, B&A was able to utilize a front-end loader/backhoe rig. The backhoe was equipped with a 2.0 cubic yard bucket.

5.3.6 Decontamination Procedures
All drilling and excavation equipment was steam-cleaned prior to arrival on site. Augers were decontaminated after their use in one boring and before their use in the next boring to prevent possible cross-contamination.

A steam cleaning/decontamination area was established on the site for the excavation equipment. All equipment was cleaned prior to its removal from the site.

5.3.7 Sample Handling
All samples were collected by B&A using surgical gloves so as to not cross-contaminate the soil samples. A fresh pair of gloves were used at each excavation area for each layer sampled and at each monitoring well.

All samples were placed in sterile containers provided by Pace and EHS, and then placed in an insulated cooler. The ambient temperature during the drilling/excavation was in the low teens to upper 20s. Any sample not delivered to the laboratory on the day collected, was refrigerated to approximately 4 degrees Centigrade.

Soil samples shipped to EHS were shipped via DHL Overnight delivery, packed in a combination of regular and Blue ice. According to EHS, the samples were received in satisfactory condition and the regular and Blue ice were both still partially frozen.

5.4 LABORATORY ANALYSES
5.4.1 Analytical Parameters
Samples were obtained from the field and were either hand-delivered to Pace's Lenexa, Kansas, facility or shipped overnight to EHS in Richmond, Virginia, for laboratory analysis. All soil samples submitted for analysis were accompanied with Chain of Custody records.

Analytical methods are summarized in the table in Section 4.3.3. The Reports of Laboratory Analyses and Chain of Custody records are included in Attachment C.

5.5 SAMPLING AND ANALYSIS

5.5.1 Monitoring Well Sampling Protocol

Four (4) monitoring wells (MW) were installed between February 26 and 28, 1996. MWs are situated running in generally a north-south direction along the long dimension of the site. Water samples from each well were collected after proper development of the wells and submitted to Pace for analysis for RCRA Metals (total), pesticides/herbicides, PCBs, and volatile and semi-volatile organics (EPA methods 8240 and 8270). Results are presented in Tables 8 through 11.

Soil samples were collected from MWs 2, 3, and 4, by use of a 2-foot split soil auger. Samples were collected in the fill and in the native soil underlying the fill. Due to driller error, no soil sample was retrievable from MW 1. B&A submitted these samples to EHS for analysis of RCRA metals by TCLP and total metals. Results are presented in Tables 8 through 13.

5.5.2 Excavation Pits Sampling Protocol and Observations

As part of the proposed work plan, B&A examined the fill placed in the 30-acre tract by excavating to the approximate depth of native soil using a backhoe. Starting March 5, 1996, B&A unearthed seventeen (17) excavated sites or "pits" across the subject site. Two in the MoKan area; one in the northern corner, and one as close to the entry as possible without interfering with the tenants' operations. The remaining 15 pits were made across the north 20-acre segment in a grid-type pattern. Samples were taken from each pit side wall (B&A did not collect loose material, but obtained the sample from the side wall) at approximately 2 to 3, 4 to 5, and 7 to 8 foot depths. Soil samples were analyzed for total metals and volatile and semi-volatile organics (8270). These were the constituents tested for by the MDNR during their analysis of surface and shallow soil samples.

The following represents B&A's observations of the individual pit side walls:

Northern 20 Acres

Pit 1 Observed some brick, concrete debris, 2 pieces of metal, approximately 7 small pieces of asphalt, and rock. No water, odors, asphalt, tires, or other types of debris noted. Pit approximately 8 feet deep.

Pit 2 Observed some brick, considerable concrete block, concrete debris, and rock. No water, odors, tires, metal, asphalt, or other types of debris noted. Pit approximately 8 feet deep. More clay present than Pit No. 1.

Pit 3 Observed considerable brick, concrete block, concrete debris, and rock. No water, odors, metal, tires, asphalt, or other types of debris noted. Pit approximately 8 feet deep.

Pit 4 Observed some brick, small amount concrete block and concrete debris, and rock. Mostly fill soil. No water, odors, tires, metal, asphalt, or other types of debris noted. Pit approximately 8 feet deep.

Pit 5 Observed some brick, some concrete block and concrete debris, rebar, and rock. No water, odors, tires, asphalt, or other types of debris noted. Pit approximately 8 feet deep. Concrete tremie noted in removed fill.

Pit 6 Observed some brick, some concrete block and concrete debris, and rock (including shale). No water, odors, asphalt, tires, metal, or other types of debris noted. Pit approximately 8.5 feet deep.

Table 8. Monitoring Well 1 - Groundwater Laboratory Results: Metals[1]

Metal	Detection Limit	SCDM Limits[2] (non-carcinogenic)	Drinking Water Standard (tap)[3]	MW-1 Results
Mercury	0.2	11.0	11.0	ND
Lead	5.0	no data	15.0	10.5
Selenium	5.0	180.0	180.0	ND
Arsenic	5.0	11.0	11.0	**24.3**
Barium	4.0	2500	2600	315.0
Cadmium	5.0	18.0	18.0	ND
Chromium	7.0	180.0	no data	22.4
Silver	7.0	180.0	180.0	ND

Notes:
1. All results in parts per billion (ppb).
2. Superfund Chemical Data Matrix values as supplied by EPA Region VII.
3. EPA Region III tap water standards.

Table 9. Monitoring Well 2 - Groundwater Laboratory Results: Metals[1]

Metal	Detection Limit	SCDM Limits[2] (non-carcinogenic)	Drinking Water Standard (tap)[3]	MW-2 Results
Mercury	0.2	11.0	11.0	ND
Lead	5.0	no data	15.0	6.7
Selenium	5.0	180.0	180.0	ND
Arsenic	5.0	11.0	11.0	10.6
Barium	4.0	2500	2600	314.0
Cadmium	5.0	18.0	18.0	ND
Chromium	7.0	180.0	no data	9.68
Silver	7.0	180.0	180.0	ND

Notes:
1. All results in parts per billion (ppb).
2. Superfund Chemical Data Matrix values as supplied by EPA Region VII.
3. EPA Region III tap water standards adapted by Region VII.

Table 10. Monitoring Well 3 - Groundwater Laboratory Results: Metals[1]

Metal	Detection Limit	SCDM Limits[2] (non-carcinogenic)	Drinking Water Standard (tap)[3]	MW-3 Results
Mercury	0.2	11.0	11.0	ND
Lead	5.0	no data	15.0	ND
Selenium	5.0	180.0	180.0	ND
Arsenic	5.0	11.0	11.0	**14.9**
Barium	4.0	2500	2600	260.0
Cadmium	5.0	18.0	18.0	ND
Chromium	7.0	180.0	no data	13.60
Silver	7.0	180.0	180.0	ND

Notes:
1. All results in parts per billion (ppb).
2. Superfund Chemical Data Matrix values as supplied by EPA Region VII.
3. EPA Region III tap water standards.

Table 11. Monitoring Well 4 - Groundwater Laboratory Results: Metals[1]

Metal	Detection Limit	SCDM Limits[2] (non-carcinogenic)	Drinking Water Standard (tap)[3]	MW-4 Results
Mercury	0.2	11.0	11.0	ND
Lead	5.0	no data	15.0	**19.80**
Selenium	5.0	180.0	180.0	ND
Arsenic	5.0	11.0	11.0	**17.60**
Barium	4.0	2500	2600	671.0
Cadmium	5.0	18.0	18.0	ND
Chromium	7.0	180.0	no data	22.90
Silver	7.0	180.0	180.0	ND

Notes:
1. All results in parts per billion (ppb).
2. Superfund Chemical Data Matrix values as supplied by EPA Region VII.
3. EPA Region III tap water standards.

Table 12. Groundwater Laboratory Results: Organochlorine Compounds[1]

Organochlorine	Detection Limit	MW-1 Results	MW-2 Results	MW-3 Results	MW-4 Results
alpha-BHC	0.03	ND	ND	ND	ND
beta-BHC	0.06	ND	ND	ND	ND
delta-BHC	0.09	ND	ND	ND	ND
gamma-BHC	0.04	ND	ND	ND	ND
Hepachlor	0.03	ND	ND	ND	ND
Aldrin	0.04	ND	ND	ND	ND
Heptachlor Epoxide	0.83	ND	ND	ND	ND
Endosulfan I	0.14	ND	ND	ND	ND
Dieldrin	0.02	ND	ND	ND	ND
4.4 DDE	0.04	ND	ND	ND	ND
Endrin	0.06	ND	ND	ND	ND
Endosulfan II	0.04	ND	ND	ND	ND
4.4 DDD	0.11	ND	ND	ND	ND
Endosulfan sulfate	0.66	ND	ND	ND	ND
4.4 DDT	0.12	ND	ND	ND	ND
Methoxychlor	1.80	ND	ND	ND	ND
Chlordane	0.14	ND	ND	ND	ND
Toxaphene	2.40	ND	ND	ND	ND

1. All results in parts per billion (ppb).

Table 13. Groundwater Laboratory Results: PCB/Other Compounds[1]

Compound	Detection Limit	MW-1	MW-2	MW-3	MW-4
PCB-1016	1.0	ND	ND	ND	ND
PCB-1221	1.0	ND	ND	ND	ND
PCB-1232	1.0	ND	ND	ND	ND
PCB-1242	1.0	ND	ND	ND	ND
PCB-1248	1.0	ND	ND	ND	ND
PCB-1254	1.0	ND	ND	ND	ND
PCB-1260	1.0	ND	ND	ND	ND
Endrin aldehyde	0.23	ND	ND	ND	ND

Notes:
1. All results in parts per billion (ppb)

Pit 7 Observed some brick, some concrete block and concrete debris, 1 piece rebar, and rock (including shale close to surface). A small layer of grayish granular fill was noted at approximately 5 to 6 feet deep. No water, odors, tires, asphalt, or other types of debris noted. Pit approximately 8.5 feet deep.

Pit 8 Observed some brick, small amount concrete block and concrete debris, one piece of PVC pipe, and rock. No water, odors, asphalt, tires, metal, or other types of debris noted. Pit approximately 8.5 feet deep. Clayey type soil.

Pit 9 Observed some brick, some concrete block and concrete debris, and rock. No water, odors, metal, tires, asphalt, or other types of debris noted. Pit approximately 9 feet deep.

Pit 10 Observed some concrete block and concrete debris, and rock. No water, odors, metal, tires, asphalt, brick, or other types of debris noted. Pit approximately 9 feet deep.

Pit 11 Observed some brick, concrete block and concrete debris, 1 piece of ceramic tile adhered to concrete, and rock (including shale in upper 3 feet). No water, odors, metal, asphalt, tires, or other types of debris noted. Pit approximately 9 feet deep.

Pit 12 Observed some brick, concrete block and concrete debris, and rock (including shale in upper 3 feet). No water, odors, metal, tires, asphalt, or other types of debris noted. Pit approximately 9 feet deep.

Pit 13 Observed small amount of brick, considerable amount of concrete block and concrete debris, and a considerable amount of rock. No water, odors, tires, metal, asphalt, or other types of debris noted. Pit approximately 8 feet deep.

Pit 14 Observed small amount of brick, some concrete block and concrete debris, and rock. No water, odors, metal, tires, asphalt, or other types of debris noted. Pit approximately 8 feet deep.

Pit 17 Observed some concrete block and concrete debris, and rock (including shale). No water, odors, metal, brick, asphalt, tires, or other types of debris noted. Pit approximately 8 feet deep.

MoKan Portion of Site

Northern tip or northwestern corner of MoKan (MoKan site not square)

Pit 15 Observed small amount of brick, 1 piece of metal conduit, small amount of concrete block and concrete debris, and rock. No water, odors, asphalt, tires, or other types of debris noted. Pit approximately 8 feet deep.

Southeastern Side of MoKan

Pit 16 Observed mostly fill, aggregate, small amount of concrete block and concrete debris, and rock. No water, odors, brick, metal, tires, asphalt, or other types of debris noted. Pit approximately 7.5 feet deep.

Pit 17 Observed mostly brown and gray fill, concrete block and concrete debris, and rock (including shale). No water, odors, brick, metal, tires, asphalt, or other types of debris noted. Pit approximately 8.0 feet deep.

Based on the Missouri regulations governing demolition fill material (Refer to Section 5.1.1), B&A observed no items in any of the pits that did not comply with the regulations. Soil samples were taken from each pit at various levels (e.g., 2'-4', 4'-6', and 6' and deeper) in an effort to characterize the soil. The results of the laboratory analysis of the soil is provided in Tables 14 through 17.

Table 14. Laboratory Analysis of Soil from Excavation Pits - Metals

Metal[1]	SCDM[2]	Pit 2	Pit 5	Pit 6	Pit 9	Pit 11	Pit 13	Pit 15	Pit 16	Pit 17
Selenium	2900	ND	ND	ND	0.55	ND	2.07	ND	ND	0.78
Aluminum	NA	8350	5920	12200	9680	10200	11900	8960	6530	12000
Antimony	230	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	170	ND	10.4	19.6	17.5	10.8	12.6	9.41	ND	15.9
Barium	41000	113	76.3	155	143	163	65.6	169	127	70.6
Beryllium	2900	0.378	0.415	0.611	0.518	0.54	0.641	0.466	0.379	0.631
Cadmium	290	ND	ND	ND	4.68	0.687	0.634	ND	ND	ND
Calcium	NA	47300	117000	21500	74800	34600	109000	22700	55500	58900
Chromium	2900	9.89	19.9	14.9	14.1	11.3	18.2	11	8.43	17.2
Cobalt	NA	5.38	4.06	9.32	7.86	7.34	7.75	6.29	4.89	11.2
Copper	NA	11	150	17.3	63.1	15.7	16.2	17	15.2	24.2
Iron	NA	10900	10600	17300	15700	13300	16300	11900	10900	21100
Lead	400[3]	19.6	79.6	48.6	124	61.5	16	95.6	41	13.1
Magnesium	NA	2580	1980	4090	3660	3030	5810	2580	4230	8520
Manganese	2900	393	228	445	554	471	385	468	308	327
Nickel	12000	13.3	23.3	23.6	24.4	16.9	25.6	15.7	13.1	33.8
Potassium	NA	1200	682	1930	1660	1370	2670	1290	1430	2300
Silver	2900	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	NA	181	163	170	201	107	202	99.8	136	186
Vanadium	4100	17.8	12	21.6	20.7	20.5	22.2	22.5	16.7	20
Zinc	170000	44.3	116	195	520	124	68.3	147	91.6	50.8
Thallium	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	170	0.157	ND	ND	0.183	ND	ND	0.247	ND	ND

NA = Not Available from EPA

ND = None Detected by laboratory analysis

NOTES:

1. All results in parts per million (ppm).
2. SCDM stands for the "Superfund Chemical Data Matrix." The EPA uses this data for screening and interpreting analytical data on the analysis of environmental samples and as a benchmark to which preliminary remedial goals (i.e., environmental cleanup levels) could be compared.
3. Residential soil level.

Table 15. Laboratory Analysis of Soil from Excavation Pits - Metals

Metal[1]	ASL[2]	Pit 2	Pit 5	Pit 6	Pit 9	Pit 11	Pit 13	Pit 15	Pit 16	Pit 17
Selenium	2900	ND	ND	ND	0.55	ND	2.07	ND	ND	0.78
Aluminum	NA	8350	5920	12200	9680	10200	11900	8960	6530	12000
Antimony	23	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	11	ND	10.4	***19.6***	***17.5***	10.8	***12.6***	9.41	ND	***15.9***
Barium	3900	113	76.3	155	143	163	65.6	169	127	70.6
Beryllium	1.2	0.378	0.415	0.611	0.518	0.54	0.641	0.466	0.379	0.631
Cadmium	28	ND	ND	ND	4.68	0.687	0.634	ND	ND	ND
Calcium	NA	47300	117000	21500	74800	34600	109000	22700	55500	58900
Chromium	NA	9.89	19.9	14.9	14.1	11.3	18.2	11	8.43	17.2
Cobalt	NA	5.38	4.06	9.32	7.86	7.34	7.75	6.29	4.89	11.2
Copper	NA	11	150	17.3	63.1	15.7	16.2	17	15.2	24.2
Iron	NA	10900	10600	17300	15700	13300	16300	11900	10900	21100
Lead	240	19.6	79.6	48.6	124	61.5	16	95.6	41	13.1
Magnesium	NA	2580	1980	4090	3660	3030	5810	2580	4230	8520
Manganese	5600	393	228	445	554	471	385	468	308	327
Nickel	1100	13.3	23.3	23.6	24.4	16.9	25.6	15.7	13.1	33.8
Potassium	NA	1200	682	1930	1660	1370	2670	1290	1430	2300
Silver	280	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	NA	181	163	170	201	107	202	99.8	136	186
Vanadium	170	17.8	12	21.6	20.7	20.5	22.2	22.5	16.7	20
Zinc	5600	44.3	116	195	520	124	68.3	147	91.6	50.8
Thallium	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	17	0.157	ND	ND	0.183	ND	ND	0.247	ND	ND

NA = Not Available from EPA/State
ND = None Detected by laboratory analysis

NOTES:

1. All results in parts per million (ppm).
2. ASL stands for "Any Use Soil Level." The state of Missouri uses this data for screening and interpreting analytical data on the analysis of environmental samples. Above these levels, the state considers placing a site on the state registry.

Table 16. Laboratory Analysis of Soil from Excavation Pits - Semi-Volatile Organics

Item[1]	SCDM[2]	Pit 2	Pit 5	Pit 6	Pit 9	Pit 11	Pit 13	Pit 15	Pit 16	Pit 17
Naphthalene	NP	ND	ND	ND	ND	ND	ND	0.12	ND	ND
4-Chloro-3-methylphenol	$12*10^5$	ND	ND	ND	ND	ND	ND	0.092	ND	ND
2-Methyl naphthalene	NP	ND	ND	ND	ND	ND	ND	ND	ND	0.073
Acenaphthene	NP	ND	ND	ND	ND	ND	ND	0.40	ND	ND
Dibenzofuran	NA	ND	ND	ND	ND	ND	ND	0.22	ND	ND
Fluorene	NP	ND	ND	ND	ND	ND	ND	0.33	ND	ND
Phenanthrene	NA	ND	4.10	0.96	0.25	0.36	0.10	4.90	0.36	ND
Anthracene	NA	ND	0.86	0.17	ND	ND	ND	1.30	ND	ND
Di-n-butyphthalate	58000	ND	ND	1.7	ND	ND	ND	ND	ND	ND
Fluoranthene	NP	ND	8.70	1.4	0.50	0.79	0.12	8.70	0.70	0.099
Pyrene	NP	ND	6.60	ND	0.56	0.63	0.13	7.40	0.86	0.073
Benzo(a) anthracene	NP	ND	2.80	0.63	0.22	0.33	ND	3.0	0.30	ND
Chrysene	NP	ND	3.50	0.66	0.23	0.36	0.072	3.5	0.30	ND
bis(2-Ethyl hexyl) phthalate	12000	ND	0.36	ND	ND	ND	ND	ND	ND	ND
Benzo(b) fluoranthene	NP	ND	3.10	.60	0.24	0.36	ND	3.10	0.32	ND
Benzo(k) fluoranthene	NP	ND	2.00	0.50	0.17	0.23	ND	2.30	0.18	ND
Benzo(a)pyrene	NP	ND	2.70	0.53	0.19	0.31	ND	2.80	0.23	ND
Indeno (1,2,3-cd) pyrene	NP	ND	1.20	0.30	0.16	0.19	ND	1.50	0.20	ND
Dibenz(a,h) anthracene	NP	ND	0.26	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i) perylene	NP	ND	1.10	ND	0.086	0.17	ND	1.40	0.20	ND

NA = Chemical Specifics Not Available from EPA
NP = Chemical data provided, but no limits provided from EPA
ND = None Detected by laboratory analysis

NOTES:

1. All results in parts per million (ppm). Only Semi-VOAs which had actual readings are reported herein. Refer to Attachment D for a complete copy of the laboratory analysis.

2. SCDM stands for the "Superfund Chemical Data Matrix." The EPA uses this data for screening and interpreting analytical data on the analysis of environmental samples and as a benchmark to which preliminary remedial goals (i.e., environmental cleanup levels) could be compared.

Table 17. Laboratory Analysis of Soil from Excavation Pits - Semi-Volatile Organics

Item[1]	ASL[2]	Pit 2	Pit 5	Pit 6	Pit 9	Pit 11	Pit 13	Pit 15	Pit 16	Pit 17
Naphthalene	NP	ND	ND	ND	ND	ND	ND	0.12	ND	ND
4-Chloro-3-methylphenol	NP	ND	ND	ND	ND	ND	ND	0.092	ND	ND
2-Methyl naphthalene	NP	ND	ND	ND	ND	ND	ND		ND	0.073
Acenaphthene	NP	ND	ND	ND	ND	ND	ND	0.40	ND	ND
Dibenzofuran	NA	ND	ND	ND	ND	ND	ND	0.22	ND	ND
Fluorene	NA	ND	ND	ND	ND	ND	ND	0.33	ND	ND
Phenanthrene	NA	ND	4.10	0.96	0.25	0.36	0.10	4.90	0.36	ND
Anthracene	NA	ND	0.86	0.17	ND	ND	ND	1.30	ND	ND
Di-n-butyphthalate	5600	ND	ND	1.7	ND	ND	ND	ND	ND	ND
Fluoranthene	NP	ND	8.70	1.4	0.50	0.79	0.12	8.70	0.70	0.099
Pyrene	NP	ND	6.60	ND	0.56	0.63	0.13	7.40	0.86	0.073
Benzo(a) anthracene	NP	ND	2.80	0.63	0.22	0.33	ND	3.0	0.30	ND
Chrysene	NP	ND	3.50	0.66	0.23	0.36	0.072	3.5	0.30	ND
bis(2-Ethyl hexyl) phthalate	360	ND	0.36	ND	ND	ND	ND	ND	ND	ND
Benzo(b) fluoranthene	NP	ND	3.10	.60	0.24	0.36	ND	3.10	0.32	ND
Benzo(k) fluoranthene	NP	ND	2.00	0.50	0.17	0.23	ND	2.30	0.18	ND
Benzo(a)pyrene	NP	ND	2.70	0.53	0.19	0.31	ND	2.80	0.23	ND
Indeno (1,2,3-cd) pyrene	NP	ND	1.20	0.30	0.16	0.19	ND	1.50	0.20	ND
Dibenz(a,h) anthracene	NP	ND	0.26	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i) perylene	NP	ND	1.10	ND	0.086	0.17	ND	1.40	0.20	ND

NA = Chemical Specifics Not Available from EPA
NA = Chemical data provided, but no limits provided from EPA
ND = None Detected by laboratory analysis

NOTES:

1. All results in parts per million (ppm). Only Semi-VOAs which had actual readings are reported herein. Refer to Attachment D for a complete copy of the laboratory analysis.

2. ASL stands for the "All Use Soil Level." The state of Missouri uses this data for screening and interpreting analytical data on the analysis of environmental samples. Any values above the ASL, the state considers placing the site on its registry of sites.

6.0 DISCUSSION OF DATA

6.1 MISSOURI SOLID WASTE MANAGEMENT LAW AND REGULATIONS

6.1.1 Missouri Solid Waste Management Law

As indicated in Section 4.1.1, one of the MDNR's concerns related to the types of fill placed on the site. Based on our observations of the fill in 17 pits across the subject site, no items were noted which would be in violation of the Missouri Solid Waste Management Regulations - 10 CFR 80, dated January 10, 1994. As specified in Section 10 CFR 80-4.010(2)(A), the following types of wastes are permitted/accepted for disposal in a demolition landfill:

- Demolition wastes
- Construction wastes
- Brush
- Wood wastes
- Tires
- Inert plastics
- Soil
- Rock
- Concrete sand
- Rock
- Gravel
- Asphaltic concrete
- Cinderblock
- Brick

Other related inert solids relatively insoluble in water can also be accepted with approval by the MDNR. The regulations also stipulate that demolition wastes cannot contain more than a small amount of metals.

The typical pit contained fill soil, concrete, concrete block, brick, and possibly (not visible in every pit) a small amount of rebar. Rebar is common to concrete-related demolition wastes. B&A noted a minor amount of asphalt scattered in areas/pits, none of which was larger than a 5 to 10 pound piece. B&A noted no other materials in any of the pits, except for Pit No. 5 which had a concrete tremie, an inert plastic/woven cloth material.

The soil samples taken and analyzed from Pits 2, 5, 6, 9, 11, 13, 15, 16, and 17 revealed no levels of contaminates above the SCDM. Only one analyte--arsenic, tested above the Missouri Any Use Soil Levels (ASL) as provided by the EPA.

6.1.2 Water Quality Results

Metals

As indicated in Tables 8 through 13, most of the readings were low to non-detected. The following was noted per sample:

MW-1 Groundwater arsenic level tested above the SCDM; MW-1 Arsenic = 24.3 ppb versus SCDM Arsenic Value = 11.0 ppb.

MW-2 None of the constituents tested greater than the SCDM.

MW-3 Groundwater arsenic level tested above the SCDM; MW-3 Arsenic = 14.9 ppb versus SCDM Arsenic Value = 11.0 ppb.

MW-4 Groundwater arsenic level tested above the SCDM; MW-4 Arsenic = 17.6 ppb versus SCDM Arsenic Value = 11.0 ppb.

The lead value in MW-4 was slightly higher than the EPA Region III (adapted by Region VII) drinking water standard. However, the groundwater is untreated versus a tap drinking water standard.

PCBs
All of the groundwater samples tested negative for PCBs.

Organochlorine (pesticide) Compounds
None of the groundwater samples tested for any of the organochlorine compounds via EPA method 8080 or 8240.

Volatile Organics (GC/MS)
None of the groundwater samples tested for any of the volatile organic compounds via EPA method 8240.

Semi-volatile Organics (GC/MS)
None of the groundwater samples tested for any of the semi-volatile organic compounds via EPA method 8270.

6.1.3 Soil Results from Monitoring Wells

As indicated in Tables 4 through 7, none of the soil samples obtained from the monitoring wells contained any metal above the SCDM value. The arsenic in the soil samples obtained from MWs 2, 3, and 4 did have arsenic slightly above the Missouri ASL value.

6.1.4 Soil Results from Excavation Pits

Metals
The results of the soil testing was compared to the SCDM (Table 14) and the Missouri ASL values (Table 15). None of the constituents (metals) in the nine soil samples tested above the SCDM were a SCDM level was provided by the EPA.

When compared to the Missouri ASL, arsenic above the ASL value of 11.0 ppb was noted in Pit Nos. 6, 9, 13, and 17. None of the other constituents were above the ASL value where an ASL value was provided.

In sampling performed by the MDNR in August 1995 (SI2), soil samples were taken from an area near the site to be used as background. According to the MDNR sampling, the level of arsenic found in the "background" sample was 10.5 ppb.

Semi-volatile Organics
Neither the EPA nor the state of Missouri had many values (SCDM or ASL) by which results could be compared. For those constituents where SCDM and ASL values were provided, none of the excavation pits had readings which exceeded the SCDM/ASL value.

7.0 CONCLUSIONS

7.1 RESULTS OF INVESTIGATION

Based on the data collected and the observations made throughout the excavation process, it appears that no improper (improper for a demolition fill site) solid waste has been deposited on the subject site. The predominant materials noted were concrete in the form of debris and blocks, brick, stone, and fill.

Of the analytes examined, only arsenic has been detected in low levels in both the soil and groundwater. The levels encountered were low with groundwater arsenic ranging from 10.6 to 24.3 ppb and soil arsenic levels ranging from none detected to 13.5 ppb. According to the MDNR investigation (SI2), a background level of arsenic for this area was obtained at approximately 10.5 ppb. Therefore, the soil values obtained for the site exceeded this background value by only 3.0 ppb, a slight difference.

Low levels of arsenic occur naturally in the environment as evidenced by the MDNR's background levels of 10.5 ppb. When compared to the Missouri ASL value, the arsenic is slightly elevated. The ASL, as described to B&A by EPA Region VII, represents analyte levels acceptable in residential settings. Currently, the subject site, like the area surrounding the site for a minimum of 0.25 miles, is zoned industrial. Based on our observations of the area, it is very unlikely that the subject site or surrounding area will be developed along residential lines.

7.2 RECOMMENDATIONS

B&A will await the review of the MDNR concerning the data presented in this report.

In a recent article in the *Kansas City Star*, dated May 25, 1996, a site was discovered by the EPA/MDNR which has very high levels of arsenic. According to the article, the site in question was used between 1942 and 1986 by three (3) companies identified as US Borax, Habco and Reade Manufacturing, and currently by Reactive Metals & Alloys Corp. B&A would request the MDNR ascertain whether these off-site sources have impacted the Leo Eisenberg site, since the Eisenberg site was never developed and only used historically as farmland.